

Editor's Pick

Japanese engineers have designed a toilet that analyzes urine for glucose concentrations, while scientists at John Hopkins Institute have developed a biochip photosensor which will be used as a retina for patients with macular degeneration. The brave new world of medical technologies is already upon us and with it the opportunity to offer patients diagnostic and therapeutic advances that just a few years ago were the material of science fiction movies.

In this issue, *wjm* is joining other medical journals worldwide in looking at the impact of new technologies in medicine, not only in terms of new gadgets but in a wider ethical context. Most of these new technologies will be less invasive and more personally tailored to individual patients. Many will be costly and only available to the developed world. What we must ensure is that all are fully evaluated before being integrated into health care and that the ethics of using them are explored and discussed not just by physicians but by everyone.

Some of the new technologies that are in place are already causing controversy. On p 293, Gary Small suggests that positron emission tomography (PET) can offer an earlier diagnosis of dementia—a disease that is currently diagnosed on the basis of clinical findings. The theoretical advantage of early diagnosis is that patients could be treated with the new drugs that some claim are said to improve cognition and perhaps delay placement in a nursing home. Not so, says Kenneth Brummel-Smith, on p 294 there is no evidence that earlier diagnosis is associated with improved quality of life or cost savings. Will this evidence deter anyone from using this new diagnostic tool? Probably not, but we need to insist that proper outcome measures and appropriate cost-benefit analyses must be part of the assessment of any new technology. Similarly on p 338, Allen J Taylor argues that electron beam computed tomography accurately quantifies the extent of coronary calcification and is an important screening tool with the benefit that is useful because patients with positive scans can be offered aggressive risk factor modification and preventive treatments. Jerry Hoffman's commentary (p 341) warns that when new technologies undergo real testing “—not measuring some parameter, or imaging some vessels, but seeing if they improve outcome—many prove far less beneficial, and are associated with adverse consequences.” These adverse consequences can include unnecessary worry and the medicalization of healthy people.

While technology will clearly offer us many new tools, the advantages of technology can be overstated. On p 322, Charlie Wilson warns that sensors such as an electronic “nose” that can detect the odors of growing bacteria, will not transform medicine overnight. Within the next 10 years, however, he expects these devices that can detect physical biological and chemical signals and provide a way for them to be measured and recorded, to change the way

hospitals operate. Sensors in beds will detect vital signs and abnormal blood chemistries, making the central laboratory largely redundant. Technologies involving gene chip arrays can determine variations in DNA sequences for individual patients, so they can be offered tailored drug regimens that suit their genome. On p 328, Wolfgang Sadée explains that variation in response to cancer chemotherapy may be explained by genetic variability. A dramatic example is tioguanine, which can kill patients who are genetically unable to inactivate the drug. To detect susceptible patients genotyping for the gene encoding thiopurine methyltransferase is already standard practice at the Mayo Clinic in Rochester and other major cancer centers.

The opportunities that new technologies offer also lead to provide bring ethical considerations. New technologies may be able to offer genetic engineering, which Caplan argues (p 335) despite connotations of Nazi Germany may be palatable on an individual basis.

The developing world of course does not have the luxury of dapppling in eugenics or being able to afford designer drugs. But technology will not pass them by. Vaccines, says Margaret A. Liu, have transformed the planet, eliminating smallpox and offering hope for the future in such diverse areas as cancer gene therapy, hypercholesterolemia and diabetes. Yet these tools will come at a real cost, forcing governments and organizations to make painful decisions. The developers and manufacturers will need to place profit in an appropriate context along side human need and suffering. Vaccines against HIV are much more likely to be affordable to the developing world than combination drug therapies. On p 363, James Kahn explains how an effective HIV vaccine has been built, while Leslie E Wolf and Bernard Lo (p 365) discuss the ethics of HIV vaccine trials.

New technologies underline the problem of educating future physicians. A teaching approach of how to learn rather than what to learn may be more realistic. On p 325 Allen Shaugnessy and David Slawson argue that we need to pay attention to how information is delivered to physicians and how they can be taught to assess both its relevance and quality.

Yet after all the scans and probes and chips, the physician will still be left to care for the patient who is scared, confused and vulnerable. It is here where technology will have the least impact, for it is here where the art of medicine will not be replaced by science of medicine. To remind us that it is still the person, rather than the blood level, organ disease or tumor mass that needs treating, a patient, movingly describes what it's like to be diagnosed with dementia. The magnetic resonance imaging test and other diagnostic tools confirm that she has Alzheimer's disease yet she has started a new job and has a full and happy life. Her words, “I must not let labels or tests determine my identity” are a reminder to us all.